

REMARKS/ARGUMENTS

In the Office Action mailed November 25, 2009, claims 7-12 and 14-25 were rejected. In response, Applicants hereby request reconsideration of the application in view of the below-provided remarks. No claims are amended, added, or canceled.

Withdrawal of Finality

As a preliminary matter, Applicants respectfully note that the present Office Action has issued new articulated reasoning as the basis for rejection under 35 U.S.C. 103(a). Thus, the arguments submitted by Applicants regarding the reasoning presented by the previous Office Action (04/24/2009) to support the combination appear to have been persuasive, because new reasoning has been presented by the Examiner in the current Office Action (11/25/2009). Applicants submit that the finality of the present Office Action is not necessitated by actions of Applicants because no substantial amendments were made to the claims to warrant the new reasoning, and the arguments presented by Applicants appear to have been persuasive as the Examiner issued new and different articulated reasoning as the basis for the rejection of claims 7-8, 11, 12, 14, and 16 under 35 U.S.C. 103(a).

Therefore, since the reasoning that forms the basis for the rejection of claims 7-8, 11, 12, 14, and 16 is new, Applicants submit that the finality of the present Office Action is premature. Accordingly, Applicants respectfully request that the finality of the present Office Action be withdrawn since the finality is premature.

Claim Rejections under 35 U.S.C. 112, first paragraph

Claims 11, 12, 14, and 25 were rejected under 35 U.S.C. 112, first paragraph, as purportedly failing to comply with the written description requirement. Specifically, the Office Action states that there is no support in the elected embodiment of new figure 1 for an absorbing layer.

The subject matter of each of claims 11, 12, 14, and 25 qualifies as a sub-species of the embodiment shown in Fig. 1. Although the subject matter illustrated in Fig. 1 does

not explicitly include an absorbing layer, there is no requirement that sub-species of the elected species cannot include additional features. Nonetheless, Applicants submit that claims 11, 12, 14, and 25 are withdrawn from consideration in order to advance prosecution. Therefore, Applicants respectfully request that the rejections of claims 11, 12, 14, and 25 under 35 U.S.C. 112, first paragraph, be withdrawn.

Claim Rejections under 35 U.S.C. 102 and 103

Claims 7, 8-12, 14-16 were rejected based on one or more cited references. The cited reference(s) relied on in these rejections include:

Nishihara et al. (U.S. Pat. No. 6,734,763, hereinafter Nishihara)

Kobrin et al. (U.S. Pat. No. 5,936,150, hereinafter Kobrin)

In particular, claims 7, 8, 11, 12, 14, and 16 were rejected under 35 U.S.C. 102(e) as being anticipated by Nishihara. Claims 7-8, 11-12, 14, 16-19, and 20-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara in view of Kobrin. However, Applicants respectfully submit that these claims are patentable over Nishihara and Kobrin for the reasons provided below.

Independent Claim 7

As a preliminary matter, Applicants submit that the Office Action appears to be inconsistent in regard to the rejections of claim 7. In the Office Action, claim 7 was rejected under 35 U.S.C. 102(e) as being anticipated by Nishihara. However, the Office Action also rejects claim 7 under 35 U.S.C. 103(a) as unpatentable over Nishihara, with the recognition that Nishihara does not disclose all of the limitations of the claim. Office Action, 11/25/09, page 5. It appears that these rejections of claim 7 under 35 U.S.C. 102(e) and 103(a) contradict each other. Even though the Examiner attempts to explain this contradiction (Office Action, 11/25/09, page 11), the rejection of claim 7 under both 35 U.S.C. 102(e) and 103(a) is not logical. Therefore, it stands that one of the above rejections is improper. Nevertheless, Applicants submit that the below arguments address the multiple rejections of claim 7.

Applicants submit that claim 7 is patentable over Nishihara, whether considered alone or modified, because Nishihara does not disclose or teach all of the limitations of the claim. Claim 7 recites:

A bulk acoustic wave (BAW) resonator comprising:
a top electrode;
a piezoelectric layer disposed adjacent to the top electrode;
a bottom electrode disposed adjacent to the piezoelectric layer,
wherein the bottom electrode is disposed opposite the top electrode
relative to the piezoelectric layer; and
a substrate disposed opposite the piezoelectric layer relative to the
bottom electrode, wherein the substrate comprises an uneven surface to
suppress a spurious mode, wherein the uneven surface is on a rear side of
the substrate facing away from the bottom electrode.

(Emphasis added.)

In contrast, Nishihara does not disclose or teach an uneven surface on a rear side of the substrate facing away from the bottom electrode. In particular, the Office Action acknowledges that Nishihara does not disclose a substrate which has an uneven surface on a rear side of the substrate. Office Action, 4/24/09, page 5. Nevertheless, the Examiner relies on the following description in Nishihara:

Unfavorably, the sacrifice layer, formed to have a thickness corresponding to the length L15, has a greater surface roughness than that of the silicon substrate 810. This deteriorates the orientation of the lower electrode 821 and the piezoelectric film 822 both of which are grown on the sacrifice layer via the SiO₂ film 840. As a result, it is difficult to obtain good resonance characteristics with the thin-film piezo-resonator.
Nishihara, col. 3, lines 4-11 (emphasis added).

However, although Nishihara indirectly mentions a surface roughness of a silicon substrate relative to the surface roughness of the sacrifice layer described in reference to Fig. 21, Nishihara does not state which surface of the substrate might have the surface roughness. In fact, from the context of the description, it appears that Nishihara implicitly refers to the top surface of the substrate on which the sacrifice layer is disposed to form the cavity, because Nishihara compares the surface roughness of the sacrifice layer to that of the substrate on which the sacrifice layer is disposed. Thus, there appears to be no correlation between the surface roughness of the sacrifice layer and the bottom

surface of the substrate (i.e., the bottom surface in Fig. 21). Hence, the description in Nishihara is insufficient to disclose or teach an uneven surface on a rear side of the substrate facing away from the bottom electrode.

Additionally, as motivation to support the conclusion of obviousness, the Examiner asserts:

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a substrate with an uneven surface, wherein the uneven surface is on a rear side of the substrate opposite the bottom electrode in Nishihara et al.'s device in order to form the device as understood by Nishihara et al.'s teachings, and in order to improve the adhesion between the substrate and the device structure (by having the uneven surface on a rear side of the substrate), respectively.

Note that forming the uneven surface on a back side or rear side of the substrate facing away from the bottom electrode, does not necessarily mean that the "rear side" of the substrate is the side which is not attached to any other layer, because both sides of the substrate are "facing away from or opposite the bottom electrode."

Office Action, 04/24/2009, pages 5-6 (emphasis added).

However, Applicants assert that the reasons cited by the Examiner to support the purported conclusion of obviousness are insufficient. First, the suggestion that it would be obvious to modify Nishihara to include an uneven surface "in order to form the device as understood by Nishihara et al." is unclear and further gives no rational underpinning to support the asserted conclusion of obviousness. Applicants submit that if the device of Nishihara were modified, the reason to modify the device cannot come from the device itself, because the device described in Nishihara is not modified in the manner suggested by the Examiner. Hence, the described process to form the unmodified device cannot logically be the basis for suggesting a modification to the device. Moreover, the device described in Nishihara would not need to be modified in order to form the device as it is already described. Therefore, the assertion that it purportedly would have been obvious to modify the substrate with an uneven surface on a rear side of the substrate to form the device of Nishihara, which is not described with such a surface, cannot be considered a rational underpinning simply because the argument is not logical.

Second, the Examiner does not provide reasoning to show how an uneven surface on the side of the substrate that faces away from the bottom electrode would improve

adhesion between the substrate and the device structure. Nishihara does not teach adhesion between the substrate and the device structure. However, Nishihara teaches that direct bonding or anodic bonding may be used to secure the cover substrate to the silicon substrate. Nishihara, col. 12, lines 45-50. In the modification suggested by the Examiner, the direct bonding or anodic bonding would suffer greatly with a rough surface area because the rough surface area would reduce the amount of contact area of the substrate that would otherwise facilitate anodic bonding. Therefore, the assumption made by the Examiner that it would be obvious to use a substrate with an uneven surface in order to improve the device characteristics by improving adhesion is technically incorrect.

Additionally, the Examiner asserts that the language of the claim is ambiguous. The Examiner suggests the description of the side of the substrate facing away from the bottom electrode could be interpreted as being either side of the substrate. The Examiner simply asserts that “both sides of the substrate are facing away from or opposite the bottom electrode” and does not show how, or support with any evidence or reasoning, the assertion that the language of the claim could be interpreted in this manner. Applicants respectfully assert that the language of the claim is clear and unambiguous.

For the reasons presented above, Nishihara does not disclose or teach all of the limitations of the claim. In particular, Nishihara does not disclose or teach an uneven surface of the substrate facing away from the bottom electrode. Additionally, the rejection of claim 7 is improper because the Office Action does not provide a rational underpinning to support the conclusion of obviousness. Accordingly, Applicants respectfully assert claim 7 is patentable over Nishihara because Nishihara does not disclose or teach all of the limitations of the claim and because the rejection of claim 7 is improper.

Independent Claims 20

Applicants respectfully assert independent claim 20 is patentable over the cited reference at least for similar reasons to those stated above in regard to the rejection of independent claim 7. The claim recites subject matter which is similar to the subject matter of claim 7 discussed above. Although the language of the claim differs from the

language of claim 7, and the scope of each claim should be interpreted independently of other claims, Applicants respectfully assert that the remarks provided above in regard to the rejection of claim 7 also apply to the rejection of claim 20.

Dependent Claims

Claims 8-10, 12-19, and 21-26 depend from and incorporate all of the limitations of the corresponding independent claims 7 and 20. Applicants respectfully assert claims 8-10, 12-19, and 21-26 are allowable based on allowable base claims. Additionally, each of claims 8-10, 12-19, and 21-26 may be allowable for further reason.

CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

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